PROC. ENTOMOL. SOC. WASH.
86(3), 1984, pp. 563–571

A NEW SPECIES OF *HYALOMYZUS* (HOMOPTERA: APHIDIDAE) FROM *HYPERICUM PROLIFICUM* IN ILLINOIS

DAVID VOEGTLIN

State Natural History Survey, Illinois Institute of Natural Resources, Natural Resources Building, 607 E. Peabody, Champaign, Illinois 61820.

Abstract.—The five morphs of *Hyalomyzus* **triangulatus** new species are described. Host records for all species of *Hyalomyzus* are given and the life cycle patterns within the genus are discussed.

Hyalomyzus mitchellensis Smith recently was described from *Hypericum mitchellianum* on Mt. Mitchell in North Carolina (Smith, 1982). At first it appeared that a previously unnamed species of *Hyalomyzus* collected in southern Illinois now had a name. However, closer examination of the specimens revealed distinct differences between the Illinois material and *H. mitchellensis*. Descriptions of the various morphs of this new species from Illinois are presented below with a review of some interesting biological aspects of *Hyalomyzus*. Measurements for all morphs are given in Table 1. Measurements in the text and Table 1 are in mm.

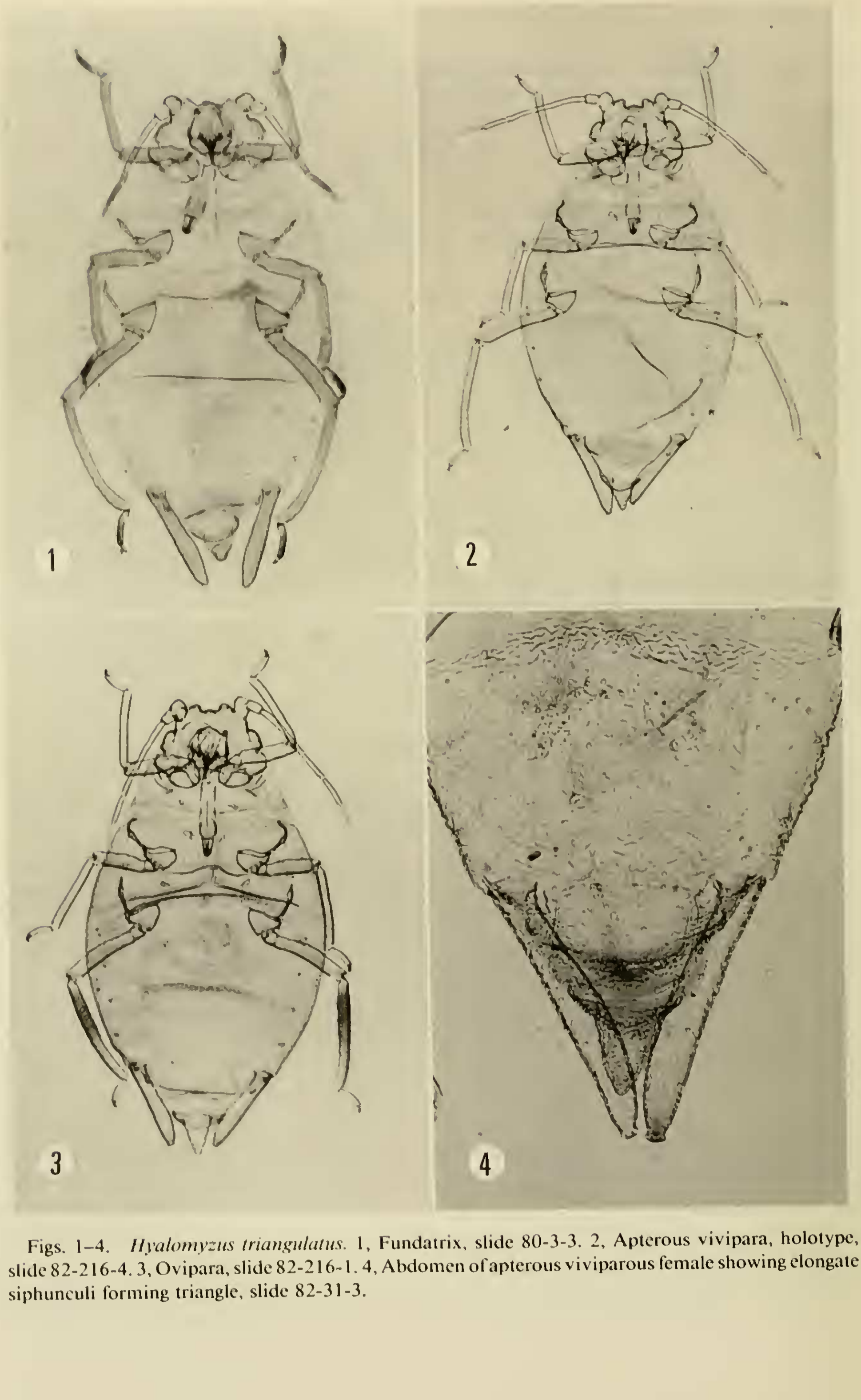
Hyalomyzus triangulatus Voegtlin, New Species

Fundatrices.—Color in life: Pale yellow to green yellow throughout. Eyes and distal half of second tarsal segments dark. Eyes of embryos visible as red dots through abdominal dorsum.

Cleared specimens (Fig. 1): Very little sclerotization with distal half of antennal segment IV, segment V, tarsal segments I and II, siphunculi and cauda slightly darker than body. Subgenital plate pale and difficult to delineate.

Morphology: Front W-shaped, rugose, with median frontal tubercle shorter than the diverging lateral frontal tubercles. Vertex with irregular ridges. Antennal segment I scabrose on median surface, segment II smooth, segments III–V becoming increasingly imbricated distad. Rostrum short, reaching second coxae. Dorsum of abdomen faintly sculptured, appearing wrinkled at 250×. Siphunculi lightly sculptured on proximal ⅓ with distal ⅔ reticulate dorsally and imbricated ventrally, swelling asymmetrically over basal ⅔ then tapering rapidly to a narrowed tip with slight flange, lateral margin as observed in slide preparations almost straight, the swelling a function of the curved median margin, angled toward median line. Stigmal pori of abdominal segments VI and VII with large, nodulose operculum, much larger than those on segments I–V. Cauda almost parallel sided on basal ⅔ then tapering rapidly to tip.

Setation: Body, vertex and antennae with few very short setae (<.006). Legs with longer setae (.006–.009). Subgenital plate with 8–10 setae on posterior margin



Figs. 1–4. *Hyalomyzus triangulatus.* 1, Fundatrix, slide 80-3-3. 2, Apterous vivipara, holotype, slide 82-216-4. 3, Ovipara, slide 82-216-1. 4, Abdomen of apterous viviparous female showing elongate siphunculi forming triangle, slide 82-31-3.

and one pair near median line on anterior margin. Last rostral segment with no accessory setae. First tarsi all with 3 setae. Cauda with 5 setae.

Material examined: Two fundatrices, on *Hypericum prolificum*, 4 km S.E. of Eddyville, Pope Co., Illinois, 3-V-80.

Apterous viviparae.—Color in life: Spring and early summer specimens much like the fundatrices. Fall specimens with darker yellow-green abdomen and yellow head and thorax. Appendages pale yellow.

Cleared specimens (Fig. 2): As in fundatrices. Some specimens almost transparent, others with sclerotized area considerably darkened. Subgenital plate lightly sclerotized and distinctly visible.

Morphology: Front and frontal tubercles rough, nodulose, lateral frontal tubercles with parallel to converging inner margins, exceeding median frontal tubercle. Vertex irregularly ridged. Antennal segment I scabrose on inner margin, segment II smooth, segments III–VI increasingly imbricated distad. Antennae of 5 or 6 segments. Dorsum of thorax and abdomen often strongly rugose, intensity of roughness varies but always distinctly more visible than in fundatrices and alatae. Siphunculi lightly sculptured on upper surface, lower, medial and lateral surface coarsely imbricated, swelling asymmetrically as in fundatrices and usually longer, angled toward median line, in life appearing to touch posterior to cauda. Stigmal pori on abdominal segments VI and VII with large nodulose operculum. Subgenital plate oval. Cauda evenly tapered from base to tip.

Setation: Body, vertex and antennae with few short setae (<.006). Legs, front and frontal tubercles with longer setae (.006–.016.). Last rostral segment without accessory setae. Abdominal tergum VIII with 2–4 setae. Subgenital plate with 5–9 setae on posterior margin and 2–5 on anterior margin. First tarsi all with 3 setae. Cauda with 4 setae.

Material examined: 46 specimens, all taken on, or progeny of specimens from, *Hypericum prolificum*, 4 km S.E. of Eddyville, Pope Co., Illinois. Field collection dates: 3-V-1980, 16-V-1982, 25-V-1980, 12-X-1982. Lab reared collection dates: 23-VI-1982, 10-XI-1982, 18-XI-1982, 20-XII-1982.

Alate viviparae.—Color in life: Yellow to greenish yellow. Darker green areas include head, pterothorax and antennae beyond base of segment III. Antennal I, II and base of III greenish yellow. Siphunculi darkening distad. Cauda deeper yellow than abdomen. Femora with basal ½ pale; distal ½ of femora, all tibiae and tarsi evenly dark green.

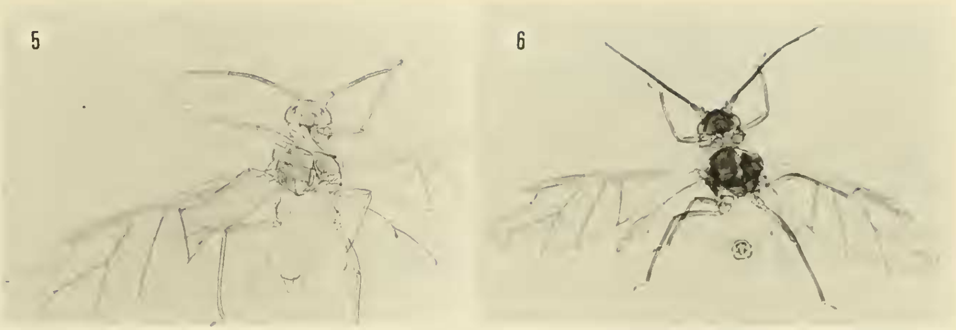
Cleared specimens (Fig. 5): Sclerotization pattern corresponds to dark areas indicated in living specimens. All sclerotized areas equally dark. Subgenital plate indistinct. Anal vein in forewings often lightly bordered on proximal edge. Other veins not bordered.

Morphology: Vertex and front relatively smooth, frontal tubercles slightly rugose with median frontal tubercle subequal to the diverging lateral frontal tubercles. Antennal I and II scabrose on inner margin, segments III–VI evenly imbricated, segments III–V with secondary sensoria. Dorsum of abdomen smooth. Siphunculi smooth to maximally swollen region then slightly imbricated, swelling and distal taper not as pronounced as in apterous forms. Stigmal pori on abdominal segments VI and VII with nodulose operculum, not as large or nodulose as in apterae. Cauda tapering evenly from base to tip.

Table 1. Measurements for the five morphs of *Hyalomyzus triangulatus*. All measurements are in mm. The symbol * refers to specimens having five antennal segments, in this case the third segment is considered to be a combination of antennal segments three and four. The abbreviation n.m. means the character could not be measured. For fundatrices and oviparae the last two segments are under columns V and VI even though they are segments IV and V. This allows the last antennal segment base and process terminalis to remain in line on the table.

specimen #	body length	antennal segments length of III	IV	V	VI b	VI pt	secondary sensoria on III	IV	V	last rostral segment	length of hind tibiae	hind tarsal II	siphunculi	cauda	number of setae on cauda
Fundatrices															
80-3-3	1.54	-*.166 -		.090	.077	.051	-	-	-	.064	.435	.096	.320	.130	5
80-3-1	1.32	-*.134 -		.077	.083	.051	-	-	-	.058	.367	.096	.320	.122	-
Apterous Viviparae															
80-3-4	1.47	-*.237 -		.115	.086	.083	-	-	-	.064	.448	.109	.384	.130	-
80-3-2b	1.10	.115	.096	.102	.096	.090	-	-	-	.064	.467	.105	.358	.115	4
80-3-2t	1.52	.128	.109	.109	.096	.090	-	-	-	.065	.480	.109	.384	.134	4
80-14-R3	1.25	-*.160 -		.096	.090	.086	-	-	-	.058	.384	.083	.301	.102	4
80-14-R1	1.47	.115	.109	.115	.102	.096	-	-	-	.064	.474	.109	.371	.118	4
82-31-1l	1.76	.122	.109	.115	.102	.090	-	-	-	.064	.480	.102	.403	.141	4
82-31-1r	1.32	-*.173 -		.090	.080	.077	-	-	-	.058	.410	.096	.339	.115	4
82-31-2l	1.61	.134	.122	.115	.096	.090	-	-	-	.064	.493	.109	.358	.134	4
82-31-2r	1.41	.109	.090	.102	.096	.093	-	-	-	.058	.422	.096	.352	.122	4
82-31-3l	1.61	-*.224 -		.128	.102	.090	-	-	-	.064	.506	.102	.390	.141	4
82-31-3r	1.38	.115	.096	.109	.090	.090	-	-	-	.064	.435	.096	.352	.115	4
82-31-4l	1.43	-*.198 -		.102	.096	.083	-	-	-	.058	.422	.102	.416	.115	4
82-31-4r	1.30	-*.166 -		.090	.090	.077	-	-	-	.058	.384	.090	.339	n.m.	4
82-216-2b	1.43	-*.166 -		.096	.090	.083	-	-	-	.064	.397	.096	.288	n.m.	4
82-216-3	1.45	-*.198 -		.102	.093	.077	-	-	-	.064	.378	.086	.301	.110	4
82-216-4	1.51	-*.198 -		.109	.096	.083	-	-	-	.064	.403	.086	.320	.128	4
82-216-5	1.51	-*.186 -		.096	.100	.083	-	-	-	.064	.422	.090	.320	.122	4
82-196-1	1.14	-*.134 -		.077	.080	.073	-	-	-	.058	.314	.077	.269	.102	4
82-222-7t	1.34	-*.205 -		.122	.109	.096	-	-	-	.064	.467	.096	.346	.141	4
82-222-7m	1.36	-*.192 -		.115	.096	.093	-	-	-	.064	.416	.090	.307	n.m.	4
82-78-1t	1.21	-*.141 -		.090	.083	.077	-	-	-	.058	.346	.077	.275	.096	4
82-78-1m	1.38	-*.160 -		.096	.093	.093	-	-	-	.058	.384	.083	.320	.102	4
82-78-1b	1.30	-*.134 -		.083	.096	.083	-	-	-	.055	.333	.077	.275	.109	4?
Alate Viviparae															
80-14-3t	1.43	.269	.179	.160	.115	.109	17	10	6	.061	.627	.102	.275	.134	4
80-14-3b	1.38	.282	.166	.134	.102	.102	17	8	5	.062	.602	.109	.275	.128	4
80-14-1	1.56	.301	.175	.141	.109	.109	19	10	4	.064	.652	.109	.301	.141	4
80-14-2t	1.36	.282	.166	.141	.102	.109	16	9	5	.064	.614	.105	.275	.122	4
80-14-2b	1.52	.262	.169	.154	.115	.112	17	7	3	.061	.614	.102	.275	.131	4
80-14-R3	1.16	.243	.147	.115	.090	.096	11	10	4	.054	.493	.090	.211	.115	4
82-31-1	1.61	-*.397 -		.141	.109	.104	-*26 -		6	.060	.621	.106	.275	n.m.	4
82-31-2	1.34	.250	.176	.134	.090	.109	18	7	3	.061	.582	.100	.256	n.m.	4
82-31-3	1.54	.288	.179	.154	.090	.090	18	8	6	.064	.621	.109	.282	.128	4
82-31-4	1.41	.275	.154	.134	.112	.122	18	9	5	.060	.595	.105	.269	n.m.	4
82-31-5	1.47	.269	.160	.141	.102	.090	16	8	4	.061	.582	.096	.262	.109	4
82-31-6	1.12	.262	.147	.128	.077	.073	17	6	3	.058	.544	.096	.250	.109	4
Ovipara															
82-216-1	1.35	-*.192 -		.102	.102	.083	-	-	-	.067	.410	.090	.320	.141	4
82-216-2	1.45	-*.212 -		.102	.109	.070	-	-	-	.064	.416	.090	.320	.128	4
82-216-3	1.54	-*.198 -		.102	.102	.077	-	-	-	.064	.410	.096	.358	.109	5
82-216-6	1.33	-*.166 -		.096	.096	.083	-	-	-	.064	.358	.083	.262	.102	4
82-222-6	1.32	-*.179 -		.102	.102	.077	-	-	-	.064	.397	.090	.294	.115	6
82-224-2	1.48	-*.173 -		.096	.093	.070	-	-	-	.061	.365	.090	.282	.128	4
82-224-3	1.41	-*.186 -		.105	.102	.083	-	-	-	.064	.390	.090	.282	.128	4
82-224-4	1.41	-*.179 -		.102	.102	.083	-	-	-	.068	.403	.093	.275	.122	4
82-224-6	1.36	-*.198 -		.109	.099	.083	-	-	-	.064	.403	.090	.320	.115	5
82-224-10	1.52	-*.179 -		.109	.102	.077	-	-	-	.068	.410	.090	.282	.131	5
Males															
82-196-2	1.18	.307	.179	.147	.128	.122	17	10	4	.070	.506	.090	.198	.096	4
82-196-1	1.21	.269	.163	.138	.122	.109	15	9	4	.064	.493	.090	.192	.083	4

Setation: Body, vertex and antennae with few short setae (<.006). Setae on frontal tubercles and mid dorsal region of tibiae longer (.006–.009). Setae on ventral region of tibiae approximately twice as long as that on dorsal region. Last rostral segment without accessory setae. Subgenital plate with 8–10 setae along posterior margin and 4–7 scattered near anterior margin. Abdominal tergum VIII with 4 setae. First tarsi all with 3 setae. Cauda with 4 setae.



Figs. 5–6. *Hyalomyzus triangulatus.* 5, Alate viviparous female, slide 80-14-2a. 6, Male, slide 82-196-2.

Material examined: 11 specimens, all taken on *Hypericum prolificum,* 4 km S.E. of Eddyville, Pope Co., Illinois. Collection dates: 14-V-1980, 16-V-1982.

Oviparae.—Color in life: Head and thorax yellow as in apterae and fundatrices, abdomen dark yellow to green. Frontal tubercles dark on inner margin. Appendages pale yellow, except for proximal ⅔ of hind tibiae which are dark yellow green.

Cleared specimens (Fig. 3): Body pale throughout, siphunculi and proximal ⅔ of hind tibiae darker. The darker region of the hind tibiae contains the pseudosensoria.

Morphology: Front and frontal tubercles rough, nodulose, lateral frontal tubercles with approximately parallel inner margins, median frontal tubercle small. Vertex moderately rugose. Antennal segment I nodulose on inner margin, segment II smooth, segments III–V increasingly imbricated distad. Dorsum of thorax and abdomen through tergum V heavily rugose, terga VI–VIII smooth to lightly rugose. Siphunculi as in apterae. Cauda tapering evenly from base to tip. Stigmal pori on abdominal segments VI and VII with large nodulose operculum. Hind tibiae with pseudosensoria confined mostly to ventral half on proximal ⅔.

Setation: Body, vertex and antennae with few short setae (<.007). Legs and front with longer setae (.006–.016). Abdominal tergum VIII with 6 setae. Subgenital plate with 10–12 setae along posterior margin and 10–12 scattered on anterior half. Last rostral segment without accessory setae. First tarsi all with 3 setae. Cauda with 4–6 setae.

Material examined: 25 specimens, all progeny of specimens taken on *Hypericum prolificum,* 4 km S.E. of Eddyville, Pope Co., Illinois. Lab reared collections: 10-XI-1982, 18-XI-82, 20-XII-82.

Males.—Color in life: Head medium green. Thorax lighter than head but darker than the pale yellow green abdomen. Distal ⅔ of femora, distal ¼ of tibiae, tarsi, antennal segments I and II concolorous with head. Antennal segments III–VI and tip of siphunculi dark green.

Cleared specimens (Fig. 6): Sclerotization pattern follows dark areas of living specimens. Antennal segments III–VI darker than all other areas, cauda and siphunculi pale. Wing veins dark not bordered. Abdomen transparent.

Morphology: Vertex and front smooth. Inner margin of frontal tubercles slightly scabrose, median frontal tubercle subequal to lateral frontal tubercles. Antennal segment I slightly scabrose on inner margin, segment II smooth, segments III–VI increasingly imbricated distad, segments III–V with secondary sensoria. Abdom-

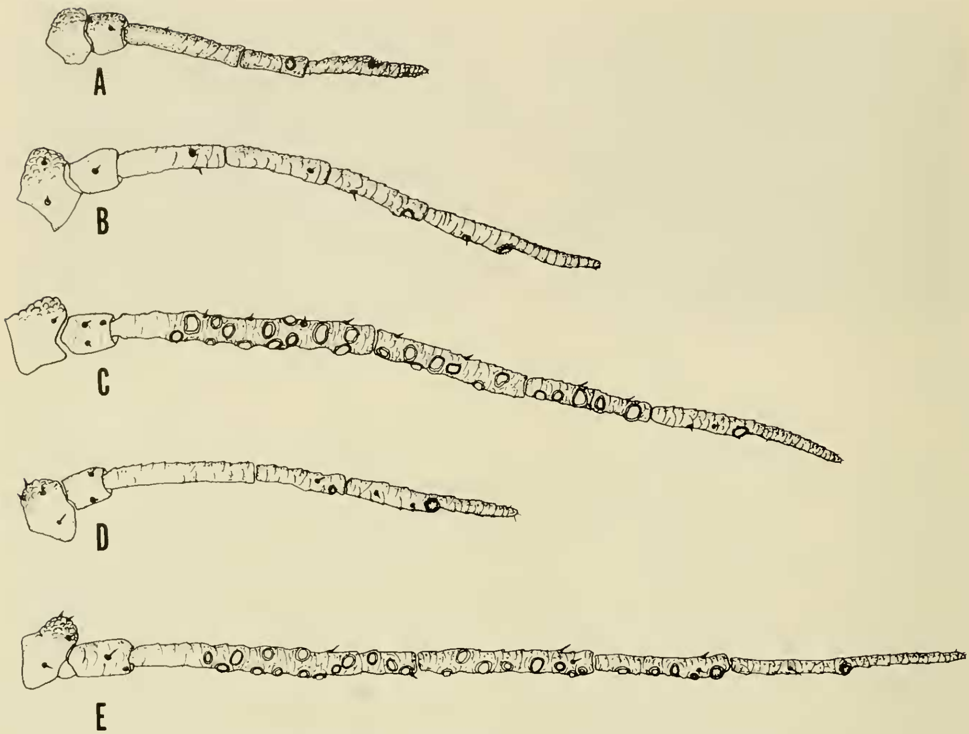


Fig. 7. Antennae of the five morphs of *Hyalomyzus triangulatus*. A, Fundatrix, slide 80-3-1. B, Apterous vivipara, slide 80-14-R1; C, Alate vivipara, slide 80-14-3b. D, Ovipara, slide 82-16-6. E, Male, slide 82-196-2. All drawn to the same scale using a camera lucida.

inal terga smooth. Distal tapered area of siphunculi with scattered fine imbrications, not as strongly swollen as in apterae, with small flange. Operculum on stigmal pori of segments VI and VII not as large or nodulose as in other forms.

Setation: As in all other forms, with few short setae (<.006) everywhere except on legs, front and cauda. Abdominal tergum VIII with 4 setae. Setae on tibiae shorter on dorsal surface as in alatae. First tarsi all with 3 setae. Last rostral segment without accessory setae. Cauda with 4 setae.

Material examined: 2 specimens, both reared from 4th instar alatoid nymphs taken on *Hypericum prolificum,* 4 km S.E. of Eddyville, Pope Co., Illinois. 12-X-1982.

Type locality.—All field collected specimens taken 4 km S.E. of Eddyville, Pope Co., Illinois.

Types.—Holotype apterous vivipara on slide 82-216-4, progeny of specimen taken on *Hypericum prolificum,* 4 km S.E. of Eddyville, Pope Co., Illinois 10-XI-1982, David Voegtlin. Deposited at the Illinois Natural History Survey. Paratypes deposited in the United States National Museum, the British Museum of Natural History, the Canadian National Collection and with D. Hille Ris Lambers. All other paratypes deposited at the Illinois Natural History Survey.

Diagnosis.—*Hyalomyzus triangulatus* can be separated from all other species of *Hyalomyzus* by the very short process terminalis (Fig. 7) (<1.1 × base of last antennal segment) and in the apterous morphs by the siphunculi extending beyond

Table 2. The species of *Hyalomyzus* are shown with their primary and secondary hosts as given in the literature. Placement of species known from only one host species or genus is under the secondary host column to show the similarity of the hosts of these species to the secondary hosts of the species with host alternation. Citations for the host records are shown below the hosts for each species.

Species	Primary Host	Secondary Host
eriobotryae (Tissot)	*Eriobotrya japonica* *Pyrus malus* *Crataegus uniflora* (Rosaceae) (Tissot, 1935)	*Lycopus virginicus* (Labiatae) (Smith, 1960)
collinsoniae (Pepper)	*Pyrus augustifoliae* (Rosaceae) (Smith, 1982)	*Collinsonia canadensis* (Labiatae) (Pepper, 1950)
monardae (Davis)		*Monarda fistulosa* *Monarda* sp. (Labiatae) (Davis, 1911) (Mason, 1940)
tissoti Nielsson & Habeck	*Crataegus vicana* *Crataegus praeformosa* (Rosaceae)	*Drosera capillaris* *Drosera* sp. (Labiatae) *Isnardia intermedia* (Onagraceae)
	(Nielsson & Habeck, 1971)	
jussiaeae Smith		*Jussiaea angustifolia* (Onagraceae) (Smith, 1960)
sensoriatus (Mason)	*Crataegus crusgalli* (Rosaceae) (Mason, 1940)	*Hypericum* sp. (Guttiferae) (Nielsson & Habeck, 1971)
mitchellensis Smith		*Hypericum mitchellianum* (Guttiferae) (Smith, 1982)
triangulatus Voegtlin		*Hypericum prolificum* (Guttiferae)

and nearly touching distad of cauda (Fig. 4). The following couplet will separate *H. triangulatus* from all other species in the genus and can be used in conjunction with the keys to apterous and alate viviparae prepared by Smith (1982).

– Process terminalis $<1.1 \times$ base of last antennal segment. On *Hypericum prolificum*. Siphunculi in apterous morphs extending beyond tip of cauda, almost touching in mounted specimens and in life. .... *Hyalomyzus triangulatus* Voegtlin

– Process terminalis $>1.6 \times$ base of last antennal segment. Not found on *Hypericum prolificum*. Siphunculi in apterous morphs not often exceeding cauda or touching on mid line .... other *Hyalomyzus* spp.

Etymology.—The trivial name is taken from the triangle formed by the siphunculi in the apterous morphs, which when viewed dorsally encloses the cauda and posterior abdominal segments (Fig. 4).

Biology.—*Hyalomyzus triangulatus* was never found to be abundant in the field. Specimens can be found in the leaf axils of *Hypericum prolificum* L. (sensu Svenson, 1952), a small shrub often found in abundance in abandoned fields in southern Illinois. This is considered to be the only host of *H. triangulatus* since both oviparae and males developed on it. Alate viviparae were collected only in the spring, a similar pattern to that observed for *H. mitchellensis* (Smith, 1982). Although I have collected this species in only one locality, I expect that it will have a wide distribution given the extensive distribution of its host plant (Utech and Iltis, 1970).

Biology of *Hyalomyzus*

Smith (1982) lists seven species of *Hyalomyzus*. These species and their host plants, as given in the literature, are listed in Table 2. Nielsson and Habeck (1971) synonymized *H. collinsoniae* with *H. eriobotryae*, but this was not accepted by Eastop and Hille Ris Lambers (1976), and Smith (1982) separated them in his keys. Published collection dates for these two species are as follows; *H. eriobotryae* has been collected in December, February and April in Florida (Tissot, 1935) and in May and June in Pennsylvania (Pepper, 1965); whereas *H. collinsoniae* has been collected in August in Florida (Pepper, 1950) and August and September in Pennsylvania (Pepper, 1965). Unpublished records on slides in the United States National Museum have *H. collinsoniae* collected in August and September and *H. eriobotryae* collected in April, May, June, November and December. These collection dates seem to support the conclusion of Nielsson and Habeck that *collinsoniae* is the summer form of *eriobotryae*. One of the characters used by Smith (1982) to separate the alatae of these two species is the presence or absence of a distinct bordering of the anal vein of the forewing, this being absent in *eriobotryae*. I examined two paratypes of this species and found the anal vein bordered in both. The holotype, an alate vivipara, however, does not show this distinct fuscos bordering of the anal vein. Tissot (1935) in the original description of *eriobotryae* stated "the anal and basal portion of the cubitus narrowly bordered with brown shading." These two species, if not synonymous, are obviously very closely related biologically as well as being morphologically similar.

Table 2 presents the host plants known for this genus, under the headings primary and secondary hosts. There is no indication in the literature that any of the species shown to have primary and secondary hosts actually had been transferred experimentally. These published host alternation patterns are apparently based on morphological similarities between specimens found on different hosts. Host transfer tests would resolve the taxonomic status of *collinsoniae* as well as verify the other life cycles.

The sequence in Table 2 is to show common host plant affinities. The first four species are associated with rosaceous shrubs as primary hosts with plants in the Labiatae or Onagraceae as secondary or only hosts. The next species is known only from Onagraceae and exists anholocyclicly in Puerto Rico. The last three are associated with *Hypericum* as the only or secondary host, and one has a rosaceous shrub as its primary host.

If we assume these life cycles are correct, they show some interesting evolutionary patterns within *Hyalomyzus*. *H. tissoti* can spend its entire life on the primary host (Nielsson and Habeck, 1971), while at the other extreme, *H. mitch-*

ellensis has apparently transferred its entire life cycle to *Hypericum*, a secondary host for this genus, and has developed wingless males, effectively eliminating the possibility of host alternation. *Hyalomyzus monardae* has been collected only from Labiatae. However, collection records from specimens in the United States National Museum and the Illinois Natural History Survey are all from June and July. Palmer (1952) recorded collections from May through early November, but fundatrices, oviparae or males are not indicated. The type of *H. monardae* was collected on May 24 and is an alate vivipara accompanied by nymphs. This suggests that *H. monardae* may alternate hosts.

I suspect that host transfer tests will confirm these proposed life cycles. Hopefully someone, in the geographic region of the species in question, will undertake the experimental work necessary to prove them.

Literature Cited

Davis, J. J. 1911. Williams' "The Aphididae of Nebraska;" a critical review. Univ. Stud. (Nebraska) 11: 253–291.

Eastop, V. F. and D. Hille Ris Lambers. 1976. Survey of the World's Aphids. Dr. W. Junk b.v., The Hague. 573 pp.

Mason, P. W. 1940. A revision of the North American aphids of the genus *Myzus*. U.S. Dept. Agric. Misc. Pub. 371: 1–30.

Nielsson, R. J. and D. H. Habeck. 1971. The genus *Hyalomyzus* (Homoptera: Aphididae), with the description of a new species. Ann. Entomol. Soc. Am. 64: 883–887.

Palmer, M. 1952. Aphids of the Rocky Mountain Region. The Thomas Say Foundation 5: 1–452; Pls. I–VIII.

Pepper, J. O. 1950. Six new aphids from Pennsylvania. Fla. Entomol. 33: 3–15.

———. 1965. A list of the Pennsylvania Aphididae and their host plants (Homoptera). Trans. Am. Ent. Soc. 91: 131–231.

Smith, C. F. 1960. New species of Aphidae: Homoptera from Puerto Rico. J. Agric. Univ. P. R. 44: 157–162.

———. 1982. A key to the species of *Hyalomyzus* (Homoptera: Aphididae) in North America, with the description of a new species. Proc. Entomol. Soc. Wash. 84: 325–331.

Svenson, H. K. 1952. What is *Hypericum prolificum*? Rhodora 54: 205–207.

Tissot, A. N. 1935. A new *Myzus* from Florida. Fla. Entomol. 18: 49–52.

Utech, F. H. and H. H. Iltis. 1970. Preliminary reports on the flora of Wisconsin No. 61. Hypericaceae—St. John's-Wort family. Trans. Wisc. Acad. Sci. Arts and Letters. 58: 325–351.